FIXED WING AND VSTOL CARRIER SUITABILITY

Launch and recovery operations aboard aircraft carriers generate enormous stresses on airplanes and installed equipment. Modern catapults can accelerate a 35-ton airplane to flying speed in 300 feet. An arrested landing is sometimes described as a “controlled crash.” Before an airplane or a new system is used aboard ship, extensive shorebased tests are conducted to ensure that the equipment can survive in the shipboard environment. The Naval Aviation Systems Team has the only shorebased carrier suitability test facilities in the United States, as well as several decades’ experience conducting fixed wing and VSTOL suitability tests.

CARRIER SUITABILITY SIMULATES SHIPBOARD ENVIRONMENT

NAWCAD carrier suitability capabilities include test facilities located at NAS Patuxent River, MD and NAS Lakehurst, NJ. These facilities are comprised of three types of catapults (including the latest version installed on the newest carriers), the latest shipboard arresting gear, and related equipment such as a jet blast deflector (JBD). The steel plated landing areas are covered with the same nonskid material as is used aboard ship. Sophisticated telemetry processing and display capabilities enable project personnel to monitor critical parameters in real time. These facilities enable structural and functional tests to be conducted in a controlled and safe environment.

Catapult launches can be conducted up to the structural limits of the airplane. Launches are conducted with the airplane centered on the catapult and with the main gear offset to investigate the effects of off-center spotting.

A series of arrested landings is conducted to expose the item being tested to the types of landings it will experience in the fleet, e.g. high sink, roll/yaw, free flight, maximum acceleration, and off-center. Arrested landings can be either fly-ins or roll-ins. Roll-ins enable precise control of engaging speed and off-center distance and are used to establish the arresting gear weight setting for a new airplane or to evaluate modifications to the gear.

The extent of the tests depends on the specific project; there may be one test loading or several. If the work involves a new airplane or modified engine, steam ingestion tests may be needed in order to ensure that the engine can tolerate the steam which is vented from the catapult during launch. For steam ingestion tests, the catapult is intentionally degraded to simulate a worst case condition by venting more steam than during a normal launch. The jet blast deflector can also affect engine operation. An airplane in front of the JBD can ingest its own exhaust; an airplane behind the JBD can ingest the exhaust of the airplane in front of the JBD. Both of these conditions are tested for new airplanes or new engines.

In addition to tests involving catapult launch and arrested landings the NAWCAD also evaluates VSTOL airplanes such as the AV-8B Harrier. Tests are conducted on various class ships to establish operating procedures and limitations and generate shipboard operating bulletins. The NAWCAD has conducted tests and published bulletins for Harriers on U.S. Navy flat deck ships as well as Spanish and Italian ski jump ships. Fixed wing unmanned aerial vehicles such as Pioneer and Hunter have also been tested aboard ship.

The NAWCAD has the facilities and expertise to evaluate all aspects of the suitability issues associated with fixed wing aircraft launch and recovery aboard ships.

For more information about Fixed Wing Carrier Suitability, contact the Naval Aviation Systems Team at Patuxent River, MD, at (301) 342-4441 extension 120.